

AMENDMENTS TO THE CLAIMS

~~{Claim 1}~~ (Currently Amended)

1. A process for preparing tetrahydropyran-4-one represented by the formula (1):



which comprises reacting at least one kind of dihydropyran-4-one and pyran-4-one represented by the formula (2):



wherein --- represents a single bond or a double bond,

and hydrogen

(a) in the presence of a metal catalyst, in a mixed solvent of an aprotic solvent and an alcohol solvent, or

(b) in the presence of an anhydrous metal catalyst in which a hydrated metal catalyst is subjected to dehydration treatment, in a hydrophobic organic solvent.

~~{Claim 2}~~ (Currently Amended)

2. The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the dehydration treatment is carried out by using an organic solvent which can be subjected to azeotropic distillation with water.

~~{Claim 3}~~-(Currently Amended)

3. The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the metal catalyst contains at least one metal atom selected from the group consisting of palladium, platinum and nickel.

~~{Claim 4}~~-(Currently Amended)

4. The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the aprotic solvent is an aliphatic hydrocarbon, a halogenated aliphatic hydrocarbon, an aromatic hydrocarbon, a halogenated aromatic hydrocarbon, a carboxylic acid ester, an ether, or a mixture thereof.

~~{Claim 5}~~-(Currently Amended)

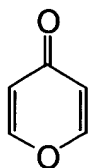
5. The process for preparing tetrahydropyran-4-one according to Claim 1, wherein an alcohol solvent in the mixed solvent is contained in the range of 5 to 95% by volume.

~~{Claim 6}~~-(Currently Amended)

6. The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the hydrophobic organic solvent is an aliphatic hydrocarbon or an aromatic hydrocarbon.

~~{Claim 7}~~-(Currently Amended)

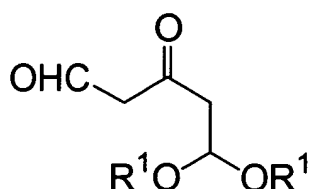
7. The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the compound represented by the formula (2) is pyran-4-one represented by the formula (2'):



(2')

~~{Claim 8}~~ (Currently Amended)

8. The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by reacting 5,5-dialkoxy-3-oxopentanal represented by the formula (3):

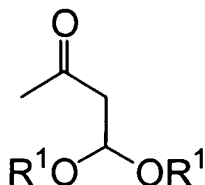


(3)

wherein R^1 represents an alkyl group, and two R^1 's may be bonded to each other to form a ring,
or an equivalent thereof, or a salt thereof with an acid.

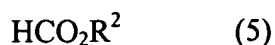
~~{Claim 9}~~ (Currently Amended)

9. The process for preparing tetrahydropyran-4-one according to Claim 8, wherein a salt of the 5,5-dialkoxy-3-oxopentanal represented by the formula (3) or a salt of an equivalent thereof is a compound obtained by reacting 1,1-dialkoxybutan-3-one represented by the formula (4):



(4)

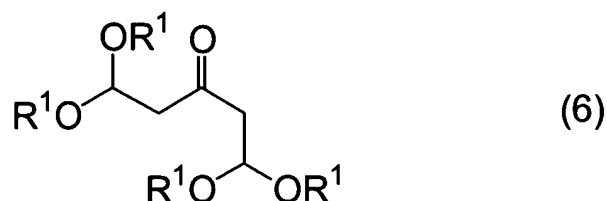
wherein R^1 has the same meaning as defined above,
and a formic acid ester represented by the formula (5):



wherein R^2 represents an alkyl group,
in an organic solvent in the presence of a base,

~~{Claim 10}~~ (Currently Amended)

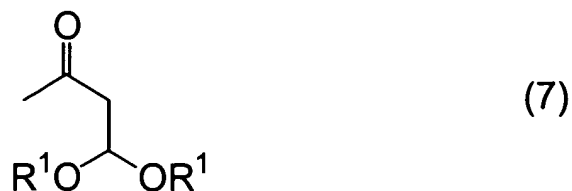
10. The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by subjecting 1,1,5,5-tetraalkoxypentan-3-one represented by the formula (6):



wherein R^1 has the same meaning as defined above,
or an equivalent thereof to cyclization in the presence of an acid.

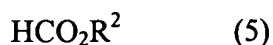
~~{Claim 11}~~ (Currently Amended)

11. The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by reacting 1,1-dialkoxybutan-3-one represented by the formula (7):



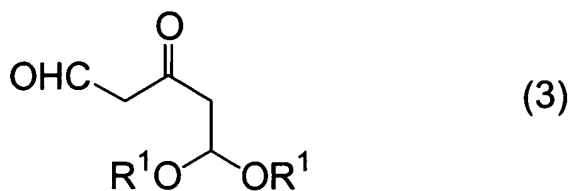
wherein R¹ has the same meaning as defined above,

or an equivalent thereof and a formic acid ester represented by the formula (5):



wherein R² has the same meaning as defined above,

in an organic solvent in the presence of a base, to form a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



wherein R¹ has the same meaning as defined above,

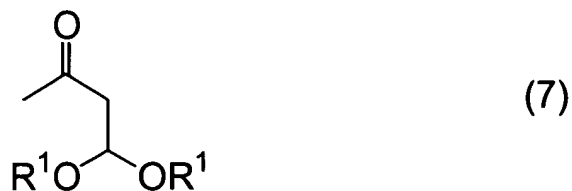
or a salt of an equivalent thereof, then, reacting an acid thereto.

~~{Claim 12}~~ (Currently Amended)

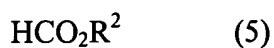
12. The process for preparing tetrahydropyran-4-one according to Claim 11, wherein the organic solvent is an aromatic hydrocarbon or a nitrile.

~~{Claim 13}~~ (Currently Amended)

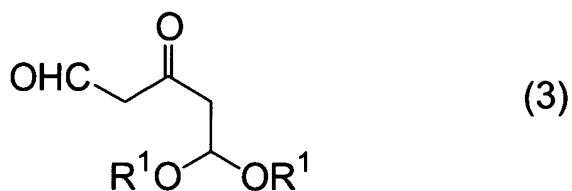
13. A process for preparing tetrahydropyran-4-one which comprises two steps of
(A) cyclization step in which 1,1-dialkoxybutan-3-one represented by the formula (7):



wherein R^1 represents an alkyl group, and two R^1 's may be bonded to form a ring,
and a formic acid ester represented by the formula (5):



wherein R^2 represents an alkyl group,
are reacted in an organic solvent in the presence of a base, to prepare a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



wherein R^1 has the same meaning as defined above,
or a salt of an equivalent thereof, and reacting the salt with an acid to prepare crude product
containing pyran-4-one represented by the formula (2'):

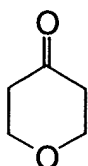


as a main component, then,

(B) reduction step in which the crude product containing the pyran-4-one as a main component
and hydrogen are reacted in the presence of a metal catalyst,

(a) in a mixed solvent of an aprotic solvent and an alcohol solvent, or

(b) in the presence of an anhydrous metal catalyst in which a hydrated metal catalyst is subjected to dehydration treatment, in a hydrophobic solvent, to prepare tetrahydropyran-4-one represented by the formula (1):



(1)

~~{Claim 14}~~ (Currently Amended)

14. The process for preparing tetrahydropyran-4-one according to Claim 13, wherein the metal catalyst contains at least one metal atom selected from the group consisting of palladium, platinum and nickel.

~~{Claim 15}~~ (Currently Amended)

15. The process for preparing tetrahydropyran-4-one according to Claim 13, wherein the aprotic solvent is an aliphatic hydrocarbon, a halogenated aliphatic hydrocarbon, an aromatic hydrocarbon, a halogenated aromatic hydrocarbon, a carboxylic acid ester, an ether, or a mixture thereof.

~~{Claim 16}~~ (Currently Amended)

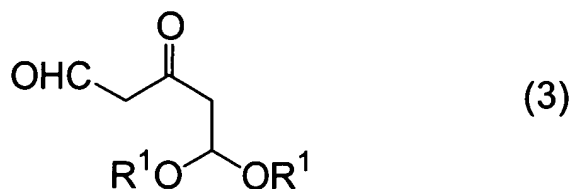
16. The process for preparing tetrahydropyran-4-one according to Claim 13, wherein an alcohol solvent in the mixed solvent is contained in the range of 5 to 95% by volume.

~~{Claim 17}~~ (Currently Amended)

17. A process for preparing pyran-4-one represented by the formula (2'):



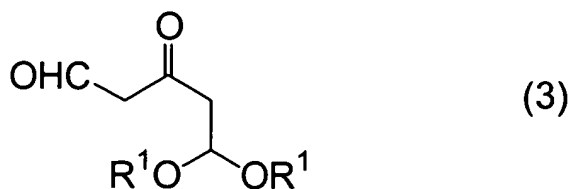
which comprises reacting 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



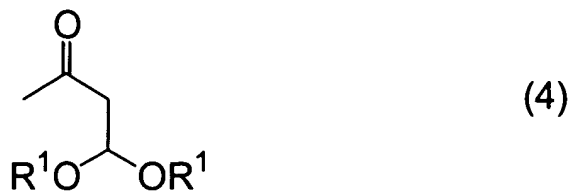
wherein R¹ represents an alkyl group, and two R¹s may be bonded to form a ring, or an equivalent thereof, or a salt thereof with an acid.

~~{Claim 18}~~ (Currently Amended)

18. A process for preparing a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



wherein R¹ has the same meaning as defined above, or an equivalent thereof, which comprises reacting 1,1-dialkoxybutan-3-one represented by the formula (4):



wherein R^1 represents an alkyl group, and two R^1 's may be bonded to form a ring,
and a formic acid ester represented by the formula (5):



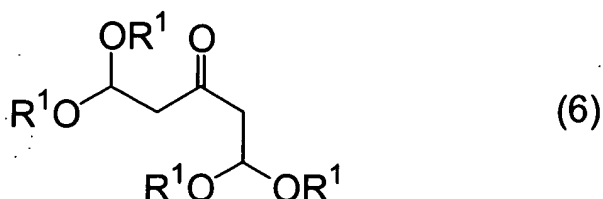
wherein R^2 represents an alkyl group,
in an organic solvent in the presence of a base.

~~{Claim 19}~~-(Currently Amended)

19. A process for preparing pyran-4-one represented by the formula (2'):



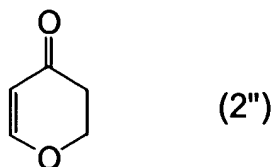
which comprises subjecting 1,1,5,5-tetraalkoxypentan-3-one represented by the formula (6):



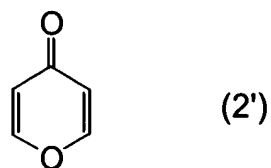
wherein R^1 represents an alkyl group, and two R^1 's may be bonded to form a ring,
or an equivalent thereof to cyclization in the presence of an acid.

~~{Claim 20}~~-(Currently Amended)

20. A process for preparing dihydropyran-4-one represented by the formula (2''):



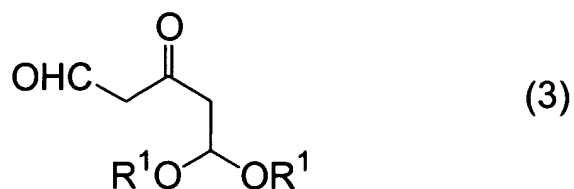
which comprises reacting pyran-4-one represented by the formula (2'):



and hydrogen in the presence of a metal catalyst, in a mixed solvent of an aprotic solvent and an alcohol solvent.

~~{Claim 21}~~ (Currently Amended)

21. A sodium salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):

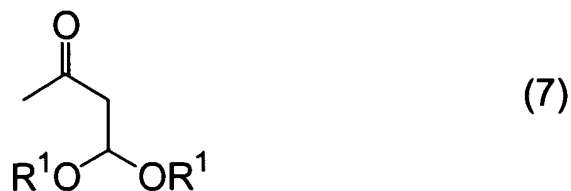


wherein R¹ represents an alkyl group, and two R¹'s may be bonded to each other to form a ring,

or a sodium salt of an equivalent thereof.

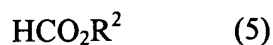
~~{Claim 22}~~ (Currently Amended)

22. A process for preparing pyran-4-one which comprises reacting 1,1-dialkoxybutan-3-one represented by the formula (7):



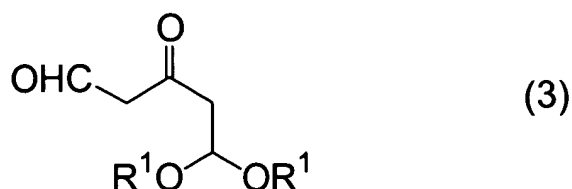
wherein R^1 represents an alkyl group, and two R^1 's may be bonded to each other to form a ring,

or an equivalent thereof and a formic acid ester represented by the formula (5):



wherein R^2 represents an alkyl group,

in an organic solvent in the presence of a base, to form a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



wherein R^1 has the same meaning as defined above,

or a salt of an equivalent thereof, and then, reacting an acid to the salt to prepare pyran-4-one represented by the formula (2'):



~~[Claim 23]~~ (Currently Amended)

23. Use of an anhydrous metal catalyst for reducing pyran-4-one and dihydropyran-4-one.

~~{Claim 24}~~ (Currently Amended)

24. The process for preparing tetrahydropyran-4-one according to ~~any one of Claims 1 to 16~~
claim 1, wherein the anhydrous metal catalyst is a material obtained by subjecting a hydrated
metal catalyst to dehydration treatment using an organic solvent which can be subjected to
azeotropic distillation with water.